



中德能源与能效合作

Energiepartnerschaft

DEUTSCHLAND - CHINA



FACTSHEET

# INTEGRATION OF CARBON CAPTURE UTILISATION/STORAGE IN EMISSIONS TRADING SYSTEMS

The ramp-up of Carbon Capture Utilisation and/or Storage (CCU/S) requires incentive systems, with emissions trading systems playing a key role. The EU Emissions Trading System (EU ETS) serves as the leading instrument for CCU/S in the European Union. The functioning and the integration of CCU/S in the EU ETS is therefore most relevant.

## Emissions trading system in the European Union

The **EU Emissions Trading System (EU ETS)** is the lead instrument for Europe's transformation towards greenhouse gas (GHG) neutrality. The EU ETS is characterised by its polluter-pays principle, technology neutrality, and efficiency in reducing GHG emissions.

Within the context of industrial transformation, emissions trading plays a critical role and is highly relevant to the market development of Carbon Capture, Utilisation and Storage (CCU/S). Various other approaches to incentivise CCU/S as a strategy for GHG reduction, along with the interactions between these incentive systems, are presented in the respective "Incentive Systems" factsheet.

This factsheet examines how CCU/S has been integrated into the EU ETS through the **Carbon Capture and Storage (CCS) and EU ETS directives**, providing an outlook on further challenges related to the integration of CCU/S.

The **EU ETS Directive** has been implemented by all European Union (EU) Member States. Additionally, **Norway, Iceland and Liechtenstein** have joined the EU ETS.

### Overview of the EU ETS

The EU ETS is a so-called **cap and trade system**. The system functions as follows (see figure 1):

1. The **"cap"** defines the total number of emission allowances.
2. Allowances are auctioned, with free allocation for sectors deemed at risk of carbon leakage. Allowances are tradable.
3. Companies must submit allowances equal to their emissions (1 allowance = 1 tCO<sub>2</sub>eq).
4. The EU specifies how quickly the number of annually issued allowances should decrease in accordance with EU's climate target.
5. Price formation takes place on the market, with prices expected to rise.<sup>1</sup>

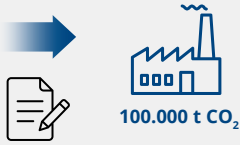
<sup>1</sup> Deutsche Emissionshandelsstelle (DEHSt) (2024) – Informationen zum EU ETS 1, [https://www.dehst.de/DE/Themen/EU-ETS-1/EU-ETS-1-Informationen/eu-ets-1-informationen\\_node.html](https://www.dehst.de/DE/Themen/EU-ETS-1/EU-ETS-1-Informationen/eu-ets-1-informationen_node.html), accessed on 02/12/2024

**1**

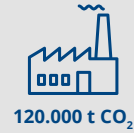
The cap defines the total amount of annual emission allowances across the included sectors.

**2**

Allocation or auctioning of allowances for a company's emissions.

**3**

Company needs more allowances.



Submission of allowances equivalent to emissions.

**4**

Company buys allowances on the market.



Receives allowances at market price.

**5**

Another company has surplus allowances.

**6**

Annual reduction of the cap in the EU ETS I starting in 2024 by 4.3%.



Figure 1: Functioning of the EU Emissions Trading System. Source: DEHSt (2024)<sup>2</sup>

The following plants and sectors must follow the rules of the **EU ETS 1**:<sup>2</sup>

- large energy plants, especially fossil-fuelled power plants, combined heat and power plants, and
- heating plants (all with a capacity of at least **20 megawatts**),
- energy-intensive plants, such as steel blast furnaces, refineries, cement factories, aluminium plants and chemical factories (N<sub>2</sub>O and Perfluoro-carbons (PFC) emissions are also covered).
- intra-European flights. For flights to and from third countries, the **Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)** rules apply. This is a system designed to offset and reduce GHG emissions in international aviation.<sup>3</sup>
- maritime transport: journeys within the European Economic Area (EEA) are covered entirely; journeys between a port in the EEA and a third country are only subject to **50 percent** of the route's emissions. The obligation applies solely to CO<sub>2</sub> emissions in 2024 and will extend to nitrous oxide (N<sub>2</sub>O) and methane (CH<sub>4</sub>) emissions starting in **2026**. For inner-EEA transport, **40 percent** of emissions were covered in **2024**, **70 percent** in **2025**, and **100 percent** from **2026** onwards.<sup>4</sup>

#### Key figures

Sectors covered by the EU ETS 1 emitted **1.09 billion tons of CO<sub>2</sub> equivalent** in **2023**, corresponding to roughly **40 percent** of total GHG emissions in the EU.<sup>2</sup>

From **2005 to 2023**, the emissions from the EU ETS 1 sectors decreased by about **48 percent**.<sup>2</sup>

#### EU ETS future development

As part of the Green Deal, the EU ETS was adjusted in 2023. The following key changes were implemented:

- By **2030**, the EU ETS cap is set to reduce emissions by **62 percent** compared to **2005**. In the EU ETS 1, the emissions cap will be reduced faster, by **4.3 percent** since **2024**, and by **4.4 percent** from 2028 onwards, instead of **2.2 percent**.<sup>2</sup>
- Aircraft operators will no longer receive free allocations starting in **2026**, and the share of allowances surrendered by the maritime sector will reach 100% from **2026**.<sup>3</sup>
- The monitoring of emissions under the **EU ETS 2 (buildings and road transport)** started in 2024, and auctioning of allowances will launch in **2027** without free allocation.

2 Deutsche Emissionshandelsstelle (DEHSt) (2024) – Informationen zum EU ETS 1, [https://www.dehst.de/DE/Themen/EU-ETS-1/EU-ETS-1-Informationen/eu-ets-1-informationen\\_node.html](https://www.dehst.de/DE/Themen/EU-ETS-1/EU-ETS-1-Informationen/eu-ets-1-informationen_node.html), accessed on 02/12/2024

3 DEHSt (2024) – Luftverkehr EU ETS 1 und CORSIA, [https://www.dehst.de/DE/Themen/EU-ETS-1/Luftverkehr/luftverkehr\\_node.html](https://www.dehst.de/DE/Themen/EU-ETS-1/Luftverkehr/luftverkehr_node.html), accessed on 02/12/24

4 DEHSt (2024) – Seeverkehr: EU-ETS 1 und MRV, [https://www.dehst.de/DE/Themen/EU-ETS-1/Seeverkehr/seeverkehr\\_node.html](https://www.dehst.de/DE/Themen/EU-ETS-1/Seeverkehr/seeverkehr_node.html), accessed on 02/12/24

## EXCURSUS – MARKET STABILITY RESERVE

The **Market Stability Reserve (MSR)** was introduced in **2015** to address the oversupply of allowances in the EU ETS. Its purpose is to balance supply and demand and strengthen the carbon market against major future disruptions. The MSR was set up in **2018** and started functioning in **2019**. It withdraws allowances when there is an oversupply and releases them when there is a shortage. In this way, the MSR helps to ensure a stable and sufficiently high CO<sub>2</sub> price.<sup>1,5</sup>

- Allowance surpluses will be controlled by an adjusted **Market Stability Reserve**.<sup>1,4</sup>
- **Starting in 2039**, no new allowances will be issued. This means that companies will no longer be allowed to emit unless they use allowances purchased earlier.<sup>6</sup>
- By **2028**, the European Commission plans to integrate thermal waste treatment plants into the EU ETS. A report on how this integration can be implemented is to be presented to the European Parliament by 2026. The report should also discuss the extent to which Member States should have an opt-out option until the end of **2030**.<sup>7</sup>

### *The Role of the EU ETS in industrial transformation*

The EU ETS operates on two levels: the price signal acts as a **push factor** for emissions reductions, while funding from ETS revenues serves as a **pull factor**.

A large portion of the revenue from auctions under the **EU ETS 1** is used to support the decarbonisation of the energy and industry sector:

- **100 percent** of the national auction revenues must be used for climate protection. In Germany, all revenues are directed to the Climate Transformation Fund.
- Additionally, there are two European funds: the Innovation Fund and the **Modernisation Fund**. The **Innovation Fund** supports innovative processes in all Member States, while the Modernisation Fund specifically helps poorer Member States.
- Revenue from the **EU ETS 2** auctions will partly go to the EU's **Climate and Social Fund**.

Additionally, the EU ETS serves as a foundation for other instruments, such as Carbon Contracts for Difference (CCfDs).<sup>1</sup>

### *Challenges for companies in the EU ETS*

One of the challenges for industry is that pricing emissions increases their costs. This might incentivise companies to relocate their production abroad, especially to countries without an equivalent price on emissions (**Carbon Leakage**). To address this issue, companies in some sectors under the EU ETS 1 receive allowances for free. The **Carbon Leakage List** determines which companies are eligible for free allocation (see box). This free allocation primarily benefits energy-intensive industries. Industries that are likely to use CCS to reduce their GHG emissions often fall under the Carbon Leakage List.<sup>8</sup>

## EXCURSUS: CARBON LEAKAGE LIST

The **Carbon Leakage List** names sectors and sub-sectors that are considered at high risk of carbon leakage due to international competition.

Companies in sectors at high risk of carbon leakage receive free allowances corresponding to **100 percent** of a sector-specific benchmark value (average emissions of the 10% most-efficient installations).

For companies in other sectors that are not on the **Carbon Leakage List**, free allowances are gradually reduced during Phase 3 of the EU ETS. Since benchmarks are based on the best-performing companies, only the most efficient companies in each sector get enough free allowances to cover all their emissions.

In Phase 4, free allowances will be focused on sectors at the highest risk of moving production outside the **EU**. The criteria for deciding if a sector or subsector is at significant risk of carbon leakage have changed. The level of carbon leakage risk is now measured using an indicator that shows both trade intensity and emissions intensity.

5 Umweltbundesamt (UBA) (2023) - Alignment of the EU ETS 1 with the new EU climate target for 2030 and reform of the Market Stability Reserve (MSR 1), [https://www.umweltbundesamt.de/sites/default/files/medien/11850/publikationen/factsheet\\_cap\\_msr\\_2023\\_en\\_v2.pdf](https://www.umweltbundesamt.de/sites/default/files/medien/11850/publikationen/factsheet_cap_msr_2023_en_v2.pdf)

6 Euractiv (2022) – Experten: CO<sub>2</sub>-Zertifikate für Industrie und Strom bis 2039 aufgebraucht, <https://www.euractiv.de/section/finanzen-und-wirtschaft/news/experten-co2-zertifikate-fuer-industrie-und-strom-bis-2039-aufgebraucht/>, accessed on 02/12/24

7 European Council (2022) - 'Fit for 55': Council and Parliament reach provisional deal on EU emissions trading system and the Social Climate Fund, <https://www.consilium.europa.eu/en/press/press-releases/2022/12/18/fit-for-55-council-and-parliament-reach-provisional-deal-on-eu-emissions-trading-system-and-the-social-climate-fund/>, accessed on 02/12/24

8 European Commission (2024) – Carbon leakage, [https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/free-allocation/carbon-leakage\\_en](https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/free-allocation/carbon-leakage_en), accessed on 02/12/24

While free allocation reduces the incentive for transformation, it helps prevent the risk of relocation due to excessive financial burden. To **phase out free allocations, the EU has introduced the Carbon Border Adjustment Mechanism (CBAM)**, the role of which will be discussed further below.

## Carbon Capture and Storage in the EU ETS

CCS is recognised as a mitigation option under the EU ETS Directive. It includes rules for monitoring, reporting and verification (MRV) of emissions that are directed towards storage. According to **Directive 2003/87/EC (European Union Emissions Trading System Directive, "EU ETS Directive")**, no ETS allowances need to be surrendered for CO<sub>2</sub> that is captured and permanently stored in accordance with the **CCS Directive**.<sup>9,10</sup> The directive covers CO<sub>2</sub> transport via pipelines and, since **April 2023**, also via other transport methods.

### *Monitoring, reporting and verification of CCS*

For the effective reduction of emissions through CCS, it is essential to ensure that CO<sub>2</sub> is permanently stored and that captured and transported **emissions can be accurately measured**.

MRV of CCS in Europe are governed by the **CCS and EU ETS Directives**.

Under the **CCS Directive**, operators of facilities using CCS technologies are required to develop an **approved monitoring plan** which must include methods for measuring and calculating the amounts of CO<sub>2</sub> captured and stored. The collected data must be reported annually and verified by an accredited body.

### **CO<sub>2</sub> Transport**

The scope of MRV includes **all installations connected to the transport infrastructure**, such as CO<sub>2</sub> interim storage, compressors, liquefaction, gasification, cleaning stations or heaters.

The CO<sub>2</sub> transport infrastructure operator determines emissions using one of the following methods:

- Total mass balance of all input and output material flows (Method A)
- Monitoring of individual emission sources (Method B)

The operator uses Method B unless they can show the authorities that Method A would provide more reliable results with less uncertainty about total emissions.

Each operator of a CO<sub>2</sub> transport system must use Method A at least once per year to check the results from Method B. The **operator** must include at least small emissions from the following equipment: seals, measurement devices, valves, intermediate pressure stations and temporary storage facilities. In case of a leak, the operator calculates the amount of CO<sub>2</sub> released by comparing changes in temperature and pressure to the average values during proper operation.

### **CO<sub>2</sub> Storage**

The measurement, monitoring and verification (MMV) of storage sites is governed by the **CCS Directive**.

The MMV process begins with the selection of the storage site. **Member States** can designate areas for storage site construction and decide whether exploration is needed. Furthermore, **Member States** are responsible for ensuring that no storage site is operated without an official storage permit, which is issued by a **designated authority**.

**Operators** must develop a detailed monitoring plan tailored specifically to each storage site. This plan must be approved by a **national authority** and reviewed every five years to incorporate the latest industry standards and advancements. Operators are also required to use appropriate monitoring methods and regularly submit detailed reports to national authorities on the monitoring results. **Member States** ensure routine and non-routine inspections of all storage complexes.

After a storage site is closed, **operators in Germany** bear liability for **40 years**; thereafter, responsibility transfers to the state.

According to the EU ETS monitoring regulation, in the event of a leakage, the operator must account for the leak and surrender an equivalent number of allowances. Reporting of emissions continues as part of the monitoring process and only ceases once corrective measures have been implemented.

9 European Union (2023) - DIRECTIVE (EU) 2023/959 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, <https://eur-lex.europa.eu/eli/dir/2023/959/oj>

10 European Union (2018) - DIRECTIVE 2009/31/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32009L0031>

## Carbon Capture and Utilisation in the EU ETS

Carbon Capture and Utilisation (CCU) is currently only recognised as an emission abatement under the **EU ETS under very specific circumstances. The revision of the EU ETS Directive includes a provision (Article 12.3.b) stating that no allowances need to be surrendered for CO<sub>2</sub>** if it is captured and permanently bound in a product, thereby preventing its re-release (also known as “Permanent CCU”). A **delegated act (C(2024) 5294)** specifies these elements in more detail and has been submitted for public consultation regarding such accounting mechanisms. The final version of the delegated act includes the following list specifying which products permanently bind CO<sub>2</sub>:

- a) carbonated aggregate, used unbound or bound in mineral-based construction products;
- b) carbonated constituents of cement, lime or other hydraulic binders used in construction products;
- c) carbonated concrete, including precast blocks, pavers or aerated concrete;
- d) carbonated bricks, tiles or other masonry units.<sup>11</sup>

Additional regulations for CCU include the following:

### *Regulation for accounting CCU in the EU ETS*

The ETS revision states that when carbon is captured and later released again, like in fuels such as Renewable Fuels of Non-Biological Origin (RFNBOs) or Recycled Carbon Fuels (RCFs)<sup>12</sup>, ETS allowances only need to be paid for once **at the point where the CO<sub>2</sub> was originally produced**. Therefore, upstream companies have no direct incentive to invest into CCU solutions.<sup>13</sup>

Currently the **REDII Delegated Act on GHG methodology** limits the use of ETS-related emissions in CCU fuels **after 2040** (after **2036** for emissions from combustion for electricity production). Captured fossil CO<sub>2</sub> will no longer be considered as avoided when used for RFNBOs/RCFs.<sup>14</sup>

### *Sustainable Carbon Cycles*

Because CO<sub>2</sub> from various sources (biogenic, fossil or from the air) is often mixed during capture or transport, it is **impossible to physically separate them**. However, for proper accounting and crediting of negative emissions, this differentiation is necessary. A potential solution could be a mass balance method or a system that tracks the origin of CO<sub>2</sub>, allowing for the correct distribution of emissions. A certification system is currently being developed in the **“Sustainable Carbon Cycles”** process at the European level.<sup>15</sup>

### *Carbon Removal and Carbon Farming Certification Regulation*

Under certain conditions, CCU processes can help remove CO<sub>2</sub> from the atmosphere (Carbon Dioxide Removal (CDR)). At the **EU level**, the framework for **Carbon Removal and Carbon Farming Certification (CRCF)** is being developed to establish the first governmental framework for certifying CO<sub>2</sub>-removals.

A delegated act in **2025–2026** is expected to clarify definitions and rules for different carbon removals solutions. The use of CO<sub>2</sub> from Direct Air Capture (DAC) or CO<sub>2</sub> from sustainable biomass in mineralisation products would be considered as carbon removals under the EU’s CRCF Regulation.<sup>16</sup>

11 European Union (2024) - C(2024) 5294, [https://eur-lex.europa.eu/legal-content/DE/TXT/?uri=PI\\_COM:C\(2024\)5294](https://eur-lex.europa.eu/legal-content/DE/TXT/?uri=PI_COM:C(2024)5294), accessed on 02/12/2024

12 RFNBOs – “RFNBO” means renewable liquid and gaseous fuels of non-biological origin. It is a product group of renewable fuels defined in the Renewable Energy Directive.  
RCF – “RCF” are defined as liquid and gaseous fuels derived from liquid or solid waste streams of non-renewable origin that are not suitable for material recovery in the Renewable Energy Directive.

13 European Commission (2024) – Renewable Energy Directive, [https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive\\_en](https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive_en), accessed on 02/12/2024

14 Unpublished report as part of the Industrial Carbon Management Strategy working groups

15 European Parliament (2022) – Sustainable Carbon Cycles, [https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733679/EPRS\\_BRI\(2022\)733679\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733679/EPRS_BRI(2022)733679_EN.pdf), accessed on 02/12/2024

16 European Commission (2024) - Carbon Removals and Carbon Farming, [https://climate.ec.europa.eu/eu-action/carbon-removals-and-carbon-farming\\_en](https://climate.ec.europa.eu/eu-action/carbon-removals-and-carbon-farming_en), accessed on 02/12/24

## OVERVIEW – CURRENT REGULATIONS FOR CCU IN EUROPE

Several legislative acts and initiatives directly impact CCU projects. These include the following:

The **European Union's Renewable Energy Directive (RED)** has several key goals focused on promoting and expanding renewable energy sources. **By 2030**, renewable energy has to account for at least **29 percent** of energy consumption in the transport sector according to the provisions in **RED III**. This includes the increased use of biofuels, hydrogen and synthetic fuels. CCU-based fuels can also be used as synthetic fuels. There is a strong emphasis on the use of green hydrogen (produced from renewable electricity) and renewable gases, with specific targets for the production and utilisation of these energy sources. Renewable gases can also be produced using CCU processes. Therefore, the RED III features quotas and targets for the use of renewable hydrogen as well as for CCU fuels such as Renewable Fuels of Non-Biological Origin (RFNBOs) and Recycled Carbon Fuels (RCFs):

- at least **5.5 percent** of the energy consumed in transport is to come from RFNBOs or advanced biofuels **by 2030**; at least **1 percent** of the sub-target has to be reached through RFNBOs.
- at least **42 percent** of the hydrogen consumed in industry is to come from RFNBOs **by 2030**; this target increases to **60 percent by 2035**. Member States may reduce the target by **20 percent** (meaning to **33.6 percent** in 2030).

In addition, specific GHG emissions accounting rules exist in the RED to drive certain activities towards biogenic carbon rather than fossil carbon (RED II, Annex 5.C), by valorising emission savings from CO<sub>2</sub> capture and replacement.

The **RED II Delegated Acts** specify which criteria and conditions must be met to produce RFNBOs and RCFs. It provides a methodology for sourcing renewable energy as well as carbon (e.g., DAC, biogenic CO<sub>2</sub>, industrial ETS CO<sub>2</sub> until **2036/2041**).

**ReFuelEU Aviation** – The directive requires airlines to use a certain proportion of sustainable aviation fuels (SAF) that produce fewer CO<sub>2</sub> emissions than conventional fossil kerosene. Quotas for SAF are introduced, which include certain biofuels, RFNBOs, RCFs and certain low-carbon fuels to reach:

- a minimum of **6, 20, 34, 42, 70 percent** by **2025/30/40/45/50** respectively.

Dedicated quotas for RFNBOs and certain low-carbon aviation fuels also exist:

- a minimum of **0.7, 5, 10, 15, 35 percent** by **2030/35/40/45/50** respectively.

**FuelEU Maritime** – The directive sets emission standards for maritime shipping, requiring shipping companies to gradually reduce the CO<sub>2</sub> emissions of their fuels. The aim is to promote the use of alternative, low- or zero-carbon fuels in maritime transport, including biofuels, hydrogen, ammonia and synthetic fuels. This also includes CCU-based fuels. The binding GHG reduction targets for fuels used on ships are:

- **2, 6, 14.5, 31, 62, 80 percent** in **2025/30/35/40/45/50**, respectively.

with a conditional quota for:

- **2 percent** RFNBOs for **2034**, if RFNBOs account for less than 1 percent of the fuel mix in 2031.

Overall, the three laws aim to boost the development of renewable fuels and, consequently, the scaling up of CCU processes for their production. However, the **main focus initially rests on bio-based methods**.

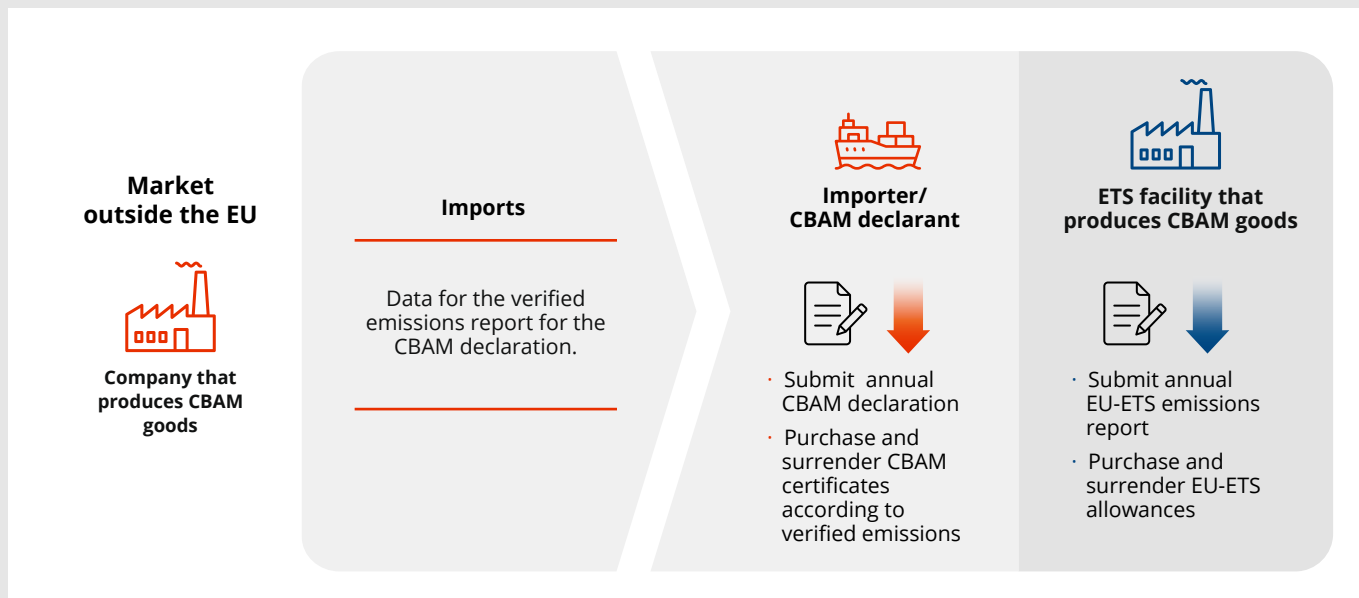


Figure 2: Functioning of the CBAM. Source: Umweltbundesamt (2023)<sup>17</sup>

## Role of the Carbon Border Adjustment Mechanism

### Goal of the Carbon Border Adjustment Mechanism (CBAM)

Phasing out **free allowances** is important for the effectiveness of the EU ETS. The **CBAM is to replace free allowances as the primary means to reduce the risk of carbon leakage** (i.e., companies moving production to countries with weaker climate regulations). Its implementation also encourages non-EU countries to adopt climate policies and manufacturers to use cleaner technologies such as CCU/S in the production of export goods. Right now, the CBAM is in its transitional phase, with penalties for non-compliance with reporting obligations. Starting **in 2026**, the pricing of embedded emissions in imported products will be gradually phased in.

### Functioning

Under the CBAM, importers of certain goods (or their indirect customs representatives) **must report the embedded emissions in their products and submit CBAM certificates that correspond to the total embedded emissions**. The amount of CBAM certificates is adjusted according to carbon prices paid abroad and the free allocation within the EU. The pricing of CBAM certificates will be determined weekly based on the average auction price of allowances in the EU ETS. Starting on **1<sup>st</sup> January 2026**, only authorised CBAM declarants will be allowed to import CBAM goods into the EU. A simplified overview of the expected functioning of the CBAM is shown in figure 2.

### Scope of the CBAM

The CBAM **applies to specific direct and indirect GHG emissions from products** as defined in Annex I of the CBAM Regulation in the following sectors: electricity,

- electricity,
- cement,
- iron and steel (only direct emissions),
- fertilisers,
- hydrogen (only direct emissions),
- and aluminium (only direct emissions).

It covers CO<sub>2</sub> emissions as well as N<sub>2</sub>O emissions from the production of certain chemicals and PFC emissions from aluminium production. Certain downstream products (e.g., screws) also fall within the scope of the CBAM. The European Commission will assess **by 2026** whether the scope of the CBAM should be expanded, for example, to include organic chemicals and polymers, to broaden the coverage of indirect emissions to the iron and steel, aluminium, and hydrogen sectors, or to include further downstream products.<sup>17</sup>

### Timetable

The CBAM started with a transition period without financial obligations and simplified reporting requirements from **October 2023** to the **end of 2025**. From **2026**, importers will have to purchase and submit CBAM certificates that correspond to the embedded emissions of the imported goods. The obligation to submit CBAM certificates will gradually increase as the free allocation of allowances to EU producers of the corresponding goods is reduced. **By 2034, free allocation for these products will be completely phased out**, and the CBAM obligation will apply to **100 percent** of embedded emissions.<sup>17</sup>

17 Umweltbundesamt (2023) - Einführung eines CO<sub>2</sub>-Grenzausgleichssystems (CBAM) in der EU, [https://www.umweltbundesamt.de/sites/default/files/medien/11850/publikationen/cbam\\_factsheet\\_de.pdf](https://www.umweltbundesamt.de/sites/default/files/medien/11850/publikationen/cbam_factsheet_de.pdf), accessed on 02/12/2024

### *Interaction with free allocations*

The number of CBAM certificates that importers must submit will be adjusted to reflect the free allocation of EU ETS allowances (Article 31). A **higher level of free allocation in the EU ETS reduces the CBAM obligation for importers**, while a lower free allocation increases the CBAM obligation. The free allocation of allowances will be phased out gradually during the definitive CBAM period starting in **2026 until 2034**.<sup>18</sup>

Since **CO<sub>2</sub> pricing will become more effective, importers covered by the CBAM will experience a stronger incentive to purchase from companies with a lower emission intensity** in the future. Relevant industries for the scale-up of CCU/S include cement and steel. In the cement industry, CCS will play a long-term role in decarbonisation due to process emissions during cement clinker production. The CBAM will contribute to creating a greater incentive for the transition.

### **Remaining challenges for CCU/S in the EU ETS**

The integration of CCS into the EU ETS has already been implemented, while regulations for permanent storage in CCU are also in place. However, **challenges still remain regarding CBAM, CCU and the integration of negative emissions**.

### *Handling of biogenic emissions in the EU ETS / Inclusion of negative emissions*

Methods like DACCS (direct air carbon capture and storage) or BECCS (bioenergy carbon capture and storage) enable carbon dioxide removal (CDR). Removals through CDR are not yet included in the ETS. There are also concerns about the sustainability of the biomass used for the purpose of BECCS. In the long term, the integration of CDR in the ETS could **allow companies to use negative emissions to compensate for residual emissions**<sup>19</sup>.

This issue is already relevant today for thermal waste treatment. In **Germany, about 50 to 60 percent** of the emissions from thermal waste treatment are biogenic, with the rest being fossil-based. **Sustainable biomass is currently accounted for with an emission factor of zero**, meaning there is no incentive within the ETS framework to capture biogenic CO<sub>2</sub>. A business case therefore only emerges if operators benefit from capturing biogenic CO<sub>2</sub>. This is possible either through demand for the production of synthetic fuels (demand-side), as enabled by quota regulations for SAF, or through compensation for achieving negative emissions. Solving the topic of CDR integration into the EU ETS is of high importance for an effective scale-up of carbon capture at thermal waste treatment facilities.

### *Regulation of CCU*

#### **Accounting**

The greatest challenge in incentivising CCU within the framework of the EU ETS is the lack of motivation for manufacturers to adopt CCU technologies, as CO<sub>2</sub> producers are generally still required to purchase allowances. Currently, only permanent CCU in products is eligible and there are no specific regulations at the EU level to change this. It **remains uncertain whether the EU ETS will become the main instrument for encouraging a shift toward CCU processes**.

#### **Certification**

Including **CCU processes in the EU ETS requires a certification for the CO<sub>2</sub> emissions avoided**. Important factors include the source of the CO<sub>2</sub> (biogenic, fossil or from the air), the lifetime of the product, and the GHG emissions from the energy used (including hydrogen). Standards for life cycle assessments and recognition as “green” products will also be necessary.

### *Carbon Leakage and the role of the CBAM*

The introduction of the CBAM replaces free allocations of allowances in the EU ETS while simultaneously reducing the risk of carbon leakage. There is an ongoing debate about whether the CBAM can fully achieve these goals. For some European markets, particularly in the cement industry, it seems very likely that the CBAM can **decrease the risk of carbon leakage**. In these sectors, the CBAM could also support the growth of CCS technology, as both industries face unavoidable process emissions. CCS is therefore a central focus in these sectors, and the CBAM may provide the additional incentive needed to accelerate its adoption across Europe.

A key challenge remains in determining how the CBAM can be implemented across all industrial sectors. This is especially relevant for **industries that operate on a global scale** or rely heavily on exports, such as the chemical and steel industries. For these sectors, the CBAM does not entirely address the issue of production costs, which remain lower in many other regions. This cost disparity means that the CBAM alone may not be enough to level the playing field.

If the **CBAM is unable to prevent carbon leakage, it could lead to significant economic restructuring**. For the CBAM to be an effective incentive across all sectors, these challenges need to be addressed to ensure that European industries can remain competitive while contributing to the EU's climate goals.

18 Umweltbundesamt (2023) - Einführung eines CO<sub>2</sub>-Grenzausgleichssystems (CBAM) in der EU, [https://www.umweltbundesamt.de/sites/default/files/medien/11850/publikationen/cbam\\_factsheet\\_de.pdf](https://www.umweltbundesamt.de/sites/default/files/medien/11850/publikationen/cbam_factsheet_de.pdf), accessed on 02/12/2024

19 Pahle, Michael; Günther, Claudia; Osorio, Sebastian, Quemin, Simon (2023) – The Emerging Endgame: The EU ETS on the Road Towards Climate Neutrality, The Emerging Endgame: The EU ETS on the Road Towards Climate Neutrality – Emissions Trading Extra, accessed on 06/12/2024

## Learnings for the Chinese context

China has also been attempting to integrate CCS into its ETS. However, due to the lack of appropriate MRV methodologies, companies find it difficult to adopt uniform standards in their declared CCS projects. Many projects still adhere to existing national and industry standards for chemical and oil and gas transportation.

Another challenge for China is the concern that large volumes of emission reductions receiving free allowances will affect carbon pricing. With carbon capture in coal-fired power plants expected to reach millions of tons annually within the next three years, the government is worried about an oversupply of allowances overwhelming the system.

Therefore, **the Chinese government has not yet integrated CCS into the ETS.**

### *Fundamental & short-term considerations*

The inclusion of CCS in the ETS is considered a logical step, as CO<sub>2</sub> pricing represents the most efficient mechanism to incentivise CCS as a mitigation option. The mechanism of this integration could be similar to the established frameworks of the EU ETS and the CCS Directive. A future inclusion in China, however, hinges on **the feasibility of robust monitoring systems**, which are not yet standardised in China. The European experience suggests there are no fundamental barriers to monitoring CO<sub>2</sub> transport and capture. Accordingly, incorporating CCS into Chinese monitoring regulations appears feasible.

A dedicated legal framework is essential for storage, including specific provisions for measurement, monitoring and verification (MMV). **The EU CCS Directive could provide a model, though adaptations would be required for application in China.**

Experience in Europe and Germany demonstrates the availability of suitable monitoring approaches. However, **Europe still faces challenges, as longterm MRV has yet to be conducted for CO<sub>2</sub> storage sites outside of research projects.** Even within Europe, clearer guidelines and regulatory frameworks for monitoring storage sites are still missing. Upcoming commercial projects like Porthos, Northern Lights and Greensand are expected to provide valuable insights and lessons in the coming years.

### *Functional incentives through emissions trading*

Beyond regulatory implementation, integrating CCU/S into ETS schemes must focus on creating incentives to drive transformation. **Based on European experience, addressing the risk of carbon leakage is essential.** Initially, free allocation of allowances in vulnerable sectors, coupled with a benchmarking system to promote efficiency, offers a pragmatic approach.

Additionally, transitional incentive systems will be necessary to support the deployment of initial CCU/S projects. **In the long term, discussions in China could explore the introduction of a mechanism similar to the CBAM or an alignment of emissions trading systems** between the EU and China to further enhance the effectiveness of the ETS.

### *Future challenges*

In Europe, significant challenges remain in addressing non-permanent CCU and integrating negative emissions into the EU ETS. In China, a **key challenge in the near future will likely be creating incentives to capture biogenic CO<sub>2</sub> from thermal waste treatment facilities.** Currently, Europe is still in the process of developing approaches to tackle this issue.

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